of lime is presented to our view in upwards of six hundred different forms, although, on analysis, we find the same simple uncombined material; how much more then must we expect variety in the mechanical and chemical arrangements of structure of bodies containing more numerous compounds and a variety of elementary products. In fact there is an endless variety constituting each division, presenting every shade of combination with each other; this renders a correct classification of rocks an impossibility, and the utmost we are enabled to do is to mark out the type or head of each distinguishing class, and the most commonly known variety of each.

Uniformity of disposition, composition, and character marks many of the sand formations of the earth; when these are united by some one common basis or cement, this uniformity of character is still maintained in sandstone; if further change takes place, and the siliceous particles thus held together assume the crystalline texture, we have still uniformity in the quartz rock; and when, under local circumstances of atmospheric or aqueous action, the quartz decomposes, we have still the same uniform matter constituting marl or clay. It is the same with many calcareous beds; they may consist of finely comminuted particles of molluscs and other exuviæ of the deep, or they may consist either with these particles and aggregate bodies of myriads of creatures, varying from each other in organical structure and mechanical arrangement of particles, but the same simple elements pervades both, and in the fossil and mineral kingdom we acknowledge the result as one consisting of the same common elements of carbon and lime; but when matters of the earth blend with these primary products of the waters, when the *reliquæ* of animals and vegetables containing other earths than lime, other compounds than carbon, enter into and become a portion of their constituent parts, the line of distinction is removed, and variety is characterized by the measure of each compound constituting in unity the one whole.

It requires no very great stretch of learning to discover the characteristic qualities of rock; the experienced architect is guided by practice, by example, as well as by the existing monuments of the past; the conditions of their existence have never hitherto been laid down in writing, and therefore it is that the inexperienced man, rushing to conclusions unaided by science, has erected monuments to his own folly, using the material most easily quarried, without reference to its durability or to the local influences to which it is exposed. But it is not the mere builder alone who generalizes on the uses and disposition of rock; the man of science generalizes also, and, following the virtuous example set by Werner, fashionably instructs you that some small portion of the earth, one insignificant locality scarcely perceptible on the map of the globe, is a fair sample of the whole, and that the law of production is in like manner uniform. It is, therefore, the more necessary, that the architect should have scientific knowledge on these matters, that he may be enabled to detect a concealed enemy in the material he is about to employ, because he is told that such material was employed some four or five thousand years since, and is still existing unimpaired, some thousand of miles distant from the spot in which he lives.

Porphyry, under its varied forms and combinations, is very abundantly distributed upon and within the superficial crust of the earth, forming, in many localities, hills and ranges of hills, and sometimes entire mountains. It is very rich in mineral veins, the clay porphyries being the most abundantly supplied with them. The method in use with the Italians, who work up the pieces of the old porphyry columns originally brought by the Romans from Egypt, is with a brass saw without any teeth. With this, together with emery and water, they rub and wear the stone with unwearied patience. Leon Battista Alberti recommends goat's blood to be used for tempering the chisels for working it, but experience has proved its inadequacy, although by this means the sculptors were enabled to make a flat or oval form, but could never attain any thing like a figure. In 1355 Cosmo de Medicis is said to have distilled a water from certain herbs with which his sculptor, Francesco Taddi, gave his tools such an admirable hardness and temper, as that he performed some fine works with them, particularly Christ's head in demi-relievo, and Cosmo's head and his duchess's. Even the very hair and beard, how difficult soever, are here well conducted; and there is nothing of the kind better in all the works of the ancients. This account is, however, very apocryphal, and it is more than probable that he followed the more certain but prolonged action of gem engraving. The French have discovered another mode of cutting porphyry, viz. with an iron saw without teeth, and with a *grez*, a kind of freestone pulverised, and water.

Porphyry, on account of its hardness, is much valued in chemistry, furnishing mortars, &c.; colourmen also use it as stones on which to grind or levigate their powders, and the same quality renders it applicable to other similar purposes. Its capability of attaining the most beautiful polish has also caused it to be brought into use and employed in architectural ornaments: thus, in a church in Rome, there are two beautiful columns of black porphyry; there are also many monuments still existing in the Eternal City, composed of this material, as well as modern works of art, wrought by the Italians from the broken pillars. The tomb of Constantia is one of the most considerable pieces now remaining entire. Apollo's and the busts of the twelve emperors now in the Tuilleries are all in porphyry. Cleopatra's needle, as it is commonly termed, and the fellow obelisk, as well as another obelisk near Cairo, and numerous figures scattered throughout Egypt, are wrought in this material. In the East Indies, black porphyry was formerly very extensively used in the architecture and architectural ornaments of the temples; and the Chinese are evidently acquainted with some mode by which they can fashion it, as it is reported to be used there in their palaces and temples, and even for domestic ornaments.

Pliny, speaking of the mineral excavations taking place in his days, says, "We hew down mountains, and we drag them from their base in quest of objects which may gratify our luxury. We remove the barriers which nature seemed to have placed between nations, and we construct vessels exclusively adapted to the transportation of marble." In periods still more remote, we find the Egyptians waging the same mighty warfare, penetrating to the very heart of the mountains to form a resting-place for their dead, erecting mighty barriers against the encroachments of the Nile, and building pyramids of brick and stone vieing in size with the mountains surrounding them. Writers find it difficult to conceive what tools the Egyptians used to fashion those mighty porphyritic monuments, whose gem-like hardness defies the best-tempered steel of our times, and many of them doubt the existence of steel instruments at this early epoch; but upon diligently tracing effects to their primary causes, we find a ready solution to the enigma. Egyptian porphyry forms in the same manner as Egyptian jasper, and under precisely the same conditions, being at first simply cohesive, and readily separable in its parts, but gradually acquiring, by long continuous atmospheric beat, a more perfect unity of parts, and, in proportion to its exposed situation, a greater degree of hardness. Upon examining the quarries from whence the obeliskes and pillars were taken, we find abundant evidence, in the chisel-marks, of iron implements having been used, and this is also demonstrated by the broken fragments scattered around; these may also be adduced as reasonable proofs of the porphyry having been in those early ages, and while hidden within the earth, or shielded by its position from the direct action of the sun, much softer than it is in the present day. This change in the condition of rock is common to every species; thus, much of the carbonate of lime in the bowels of the mountains is exceedingly soft in the present day; as for instance, the inner chamber of the tomb of the kings discovered by Belzoni; but upon long exposure to the atmospheric action, it becomes highly indurated. Again, some of the huge porphyritic bodies exhibit phases of change in their physical condition, as they have dipped into the earth, and the monument, or other sculptured object, some of which we have in the British Museum, exhibits a party-coloured appearance, as though formed by different kinds of rock. Again, in the gallery of Egyptian antiquities, may be observed figures sculptured in breccia, which is none other than the first passage of nature into the crystalline or semi-crystalline form of rock; and here, it may be observed, cohesion terminates, as the sand and gravel bed dips into the bosom of the earth.

It should be known that all varieties of rock, while existing in their natural state, undergo changes until they have attained perfection, according to their nature, passing gradually from their disintegrated form of earth to their matured or indurated state, when they become incapable of further change in atomic structure, and continue to exist in this state, on sufferance of climate, or absence of corroding or destroying causes. As the soft nodules of silica harden into gems upon exposure to tropical heat, so the larger siliceous mass, termed porphyry, progresses towards the like improved condition, the degree of hardness it acquires depending on the nature, union, and disposition of its material. Some of the porphyries are closely allied to breccia, the sands and pebbles being cemented together by clay; and the highly indurated clay porphyry is the hardest of all varieties, being in the topaz-like state; but inasmuch as in many varieties it contains bodies simply siliceous, or of a still softer nature, so is it very often exceedingly variable in this respect, even in the same piece of rock.

The Egyptians were well acquainted with corundum, the sapphire, the ruby, the emerald, the topaz, emery and adamantine spar, and also with the fact, that the pounded material of the porphyry, as well as the sandy particles, partook of the nature of the rock, and I am therefore inclined to suppose that they made free use of bodies of this nature, as the natives of the East do in the present day. Da Costa imagines, that by unwearied diligence and with numbers of common tools, they rudely hewed and broke the stone into the intended figure, and by continued application reduced it into regular designs. The modes of working it into figures were various, for some appear to have been wrought with the chisel, others with the saw, others with wheels, and others have evidently been ground down with emery, or some other very hard substance. There is no doubt that much time and labour were bestowed upon them, and time and labour were of as little value to the rulers of Egypt in those days as they are at present; of this we have evidence in the multitudes employed on the pyramids and other public works, independent of the incessant labour of canal digging.

Wallerius makes porphyry a species of jasper; and, as I have previously observed, there is in both an uniformity of composition and character, and both are formed under the same influences; the existing differences arise from the former consisting of large ponderable masses or beds, whereas the jaspers are merely small nodules.

The purple porphyry is extremely hard, compact, and heavy, of a fine strong purple, variegated more or less with pale red and white, and with a small number of little black flaky spots. Its purple is of all degrees, from the deep tinge of the violet to a pure claret colour. It abounds in Egypt; and the smaller masses or nodules concreting together, pass by transition into rose jasper: this is also another striking proof that the one and the other claim the same common origin.

In the above explanations on the origin of porphyry and Egyptian jasper, I have demonstrated the non-volcanic nature of these rocks and stones; in the Egyptian and Nubian deserts, where they abound, and from whence they have been formerly quarried, in order to administer to the grandeur and luxury of the Romans, they are disposed in and among pure and undisturbed oceanic beds, the jaspers forming the surface of the valleys, from the fossilized remains of oceanic bodies, separately, as fossilised fishes, molusceus and crustaceous animals; or united in clumps or small groups by a calcareous cement analogous to their nature; the porphyries, on the other hand, are vast aggregate masses, composed of all these various bodies and fragments of bodies, presenting elevated cliffs and hills of this most beautiful product, in conjunction with many beautiful coloured marbles. Their laws of formation are long continuous atmospheric heat, exercised upon a desert or sterile soil, pregnant with saline matters, acids, and alkalies in their uncombined state, and the absence